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ABSTRACT

A survey was conducted to assess environmental data users' interest in a referral system such as the National Environmental Data Referral Service (NEDRES) and to gauge user willingness to participate in a proposed NEDRES network and to comply with a system of NEDRES user fees. Twenty-one organizations were identified and 3,200 individuals were randomly selected for the survey. Valid responses from 794 individuals (25.2 percent) were returned. The survey addressed four areas of concern: Is there a need for NEDRES services? What is the ideal system configuration? What should the data base contain? How willing are potential users to participate in and pay for the service? Findings indicate that NEDRES would be useful, a computer searchable file of environmental data sources would be the most useful of proposed NEDRES services, and that on-line searching was the preferred method of accessing NEDRES. Additional findings indicate that NEDRES should include descriptions of the measured environmental parameters of each file listed, almost half of the respondents expressing a willingness to provide indexes of their data holdings to NEDRES, acceptability of training-related costs, and that nearly 30 percent were willing to pay for NEDRES services, although most preferred a "pay-as-you-go" system. (JN)

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MAXIMA

THE MAXIMA CORPORATION

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Final Report

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National Oceanic and Atmospheric Administration
Rockville, Maryland

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EXECUTIVE SUMMARY

This report presents the results of a survey of environmental data users conducted on behalf of the Environmental Data and Information Service (EDIS) of the National Oceanic and Atmospheric Administration (NOAA) in support of the proposed National Environmental Data Referral Service (NEDRES). The NEDRES User Survey was conducted by The MAXIMA Corporation from February 1982 through June 1982. It was conducted primarily to assess the interest of environmental data users in a referral service such as NEDRES. The survey was also used to gauge user willingness to (1) participate in a proposed NEDRES network and (2) to comply with a system of NEDRES user fees.

The survey methodology initially involved an attempt to identify the entire universe of environmental data users. Because of the size, scope, and diversity of this user group, it was decided to target specific organizations likely to include environmental data users within their memberships. Twenty-one such organizations were identified; subsequently, 3200 individuals to be surveyed were selected randomly from these groups. Discounting "post office returns," a total of 794 valid responses were returned for a response rate of 25.2 percent.

The analysis addressed four areas of primary concern or "research questions" which were also reflected in the questions posed the respondents in the survey instrument.

- Is there a need for the services to be provided by NEDRES?
- What is the ideal system configuration?
- What should the data base contain?
- How willing are potential users to participate in and pay for the service?

Several key findings resulted from the survey effort.

- Nearly all of the respondents indicated that NEDRES would be useful and a large portion of those surveyed indicated that NEDRES would be extremely useful in their work.

- Respondents indicated that a computer searchable file of environmental data sources would be the most useful of the proposed NEDRES services.

- The most preferred method of access to NEDRES information was to search on-line using their own computer terminals.

- It was important to the respondents that the data base developed for NEDRES include descriptions of the measured environmental parameters of each data file listed. It was also important to include a description of the geographic and chronological coverage of the data.

- Not quite half of the respondents expressed a willingness to provide indexes of their data holdings to NEDRES. A few more than half indicated a willingness to respond to requests for data referred to them through NEDRES.

- Nearly 30 percent of the respondents were willing to pay for NEDRES services, though most desired a "pay-as-you-go" system as opposed to a fixed monthly or annual fee.

- Most respondents also indicated that training-related costs would be acceptable.

- An overwhelming majority of the respondents expressed interest in receiving more information concerning NEDRES as it develops.

The methodology employed and the sample are described in the body of the report which follows. Additional details about the results of the survey are also contained in the last section of this report.

National Environmental Data Referral Service (NEDRES) User Survey
Final Report

BACKGROUND

This paper presents the results of the National Environmental Data Referral Service (NEDRES) User Survey which was conducted from February 1982 through June 1982. The survey was conducted by The MAXIMA Corporation for the Environmental Data and Information Service (EDIS) of the National Oceanic and Atmospheric Administration (NOAA). It was designed to provide EDIS with the general reaction of environmental data users to the NEDRES concept, as well as indicate the specific user needs NEDRES should attempt to satisfy. The survey was also intended to ascertain the willingness of potential NEDRES users to cooperate in a voluntary network by identifying and describing their environmental data files and to comply with a system of user fees. The user fee issue is an extremely vital one considering the atmosphere of fiscal austerity in which NEDRES is currently being developed.

NEDRES is intended to improve access to the many sources of environmental data located in the United States and elsewhere by providing referrals, i.e., directing the data user to the data sources best suited to their needs. Since NEDRES is the first service of its kind relating to a very broad range of environmental data, a large portion of the program development activities will involve simply identifying, locating, and indexing data files that are available for public use. The survey attempted, therefore, to make preliminary identification of data file holders willing to participate in development of NEDRES by making descriptions of their data holdings available to NEDRES users.

The overall results of the survey provide the kind of information that will allow EDIS to fine-tune the NEDRES program to be responsive to the needs of its users. The survey findings are presented in this report following a description of the methodology used to conduct the survey. The methodology section includes a description of the survey sample and the method by which it

was drawn, a description of the survey instrument and the method by which it was distributed, and a description of the data analysis procedures used including computer processing and statistical analyses. Conclusions are presented in the final section of the report.

METHODOLOGY

The first step in the conduct of the NEDRES user survey was to identify the universe of current and potential users of environmental data from which a random sample could be selected. The environmental data user universe is, however, difficult to identify because of its size, scope, and diversity of fields in which members are involved. MAXIMA attempted, therefore, to locate data users representative of those who would use NEDRES rather than to actually define the entire user universe. A number of priorities were set by EDIS which assisted MAXIMA in this task:

1. It was important to target users of climatological data. NEDRES is being developed over a five year period and one of the interim steps to complete implementation is the development of the Climate Information Clearinghouse service. Survey responses from climatologists can provide input to this task. It is also already known that climatic data are among the most frequently requested data now provided by NOAA information services, specifically the National Climatic Center.

2. Emphasis was placed on obtaining responses from the private sector. Because of the importance of the user fee system, the survey needed to assess the demand for NEDRES among those professionals in the private sector where the ability to pay is greater than in government or other public institutions.

3. A broad range of industries needed to be represented in the sample. Environmental data are used in many sectors of the business community; a sample that did not reflect this broad range of uses would be defective.

4. Another requirement was to include representatives from state and local governments and the university research community in the

sample. State and local government officials will not only act as users of NEDRES but may also be called upon to participate in the cooperative networking aspects of the program. Many universities are also known to be frequent users of environmental data. Responses from government and university officials can provide an indication of how active these entities can be expected to be and, on the other hand, what kind of services they may expect from NEDRES.

Sample Selection

MAXIMA followed two basic steps in identifying potential survey candidates that fit the above criteria. First, lists of known environmental data users were obtained from the Environmental Data and Information Service of NOAA. Secondly, MAXIMA contacted many professional and trade associations that were likely to include members that would use environmental data and thus be interested in the NEDRES program. These efforts produced an initial survey sample approved by EDIS.

The actual sample selection was completed in two phases. The first phase involved identifying the high priority user groups, that is, groups among those identified whose total membership was extremely likely to be users of environmental data. All members of these high probability groups were surveyed.

With the help of EDIS representatives, and through direct contact with the associations and organizations, the following groups were selected for the 100% representation.

Table 1. High Priority User Groups

ORGANIZATION	NO. OF MEMBERS
American Association of State Climatologists	42
Climate Information Users Group (non-federal)	11
National Council of Industrial Meterologists	38
Professional Consulting Meteorologists	94

The second phase of the sample selection involved randomly selecting subjects from mailing lists and membership lists obtained from professional associations. No fewer than ten subjects were selected from each organization. The following organizations contributed to the sample:

- American Fisheries Society (Marine Fisheries Division)
- American Geophysical Union (primary affiliation: Meteorology)
- American Meteorological Society
- American Mining Congress (Undersea Mineral Resources Committee)
- American Public Power Association
- American Society for Information Science (Energy and Environment Subgroups)
- American Society of Agricultural Consultants
- American Society of Civil Engineers
- Chemical Companies (Dun & Bradstreet)
- Integrated Data Users Workshop (Participants 1981)
- Insurance Companies (Dun & Bradstreet)
- Marine Technology Society
- National Ocean Industries Association
- Ocean Coastal States Policy Committee
- Special Libraries Association (Environmental Information Division)
- State Natural Heritage Programs
- State Representatives for Environmental and Natural Resources Information Systems

In all, 3200 individuals were surveyed. The goal of the survey was to obtain at least 25% valid responses from users of environmental data who might benefit from NEDRES.

Survey Instrument

A survey instrument was developed by MAXIMA which addressed the major issues discussed earlier in this paper. The questionnaire went through a

number of iterations, each reviewed by EDIS staff. The final version of the questionnaire appears in Appendix A. It consists of a coer letter from the then director of EDIS, Thomas Potter, a description of NEDRES, and 23 questions for the respondents to answer as well as space for additional comments, if any.

A clearance package was prepared for submission to the Office of Management and Budget for approval of the survey effort. During the time required for the approval process, the final mailing lists were prepared for the sample selected. The first mailing of 1000 surveys was completed in the first week of March 1982. Respondents were requested to return the completed questionnaires within 15 days. Three weeks later it was decided to do a second mailing of 200 questionnaires due to a lower than expected response rate. A total of five mailings were conducted for a total of 3200 questionnaires. Post office returns totaled 56 and completed responses actually included in the analyses totaled 794 for a response rate of 25.2 percent. The results of the mailings are presented in the table below.

Following the initial mailing of 1000 surveys, telephone follow-up was conducted in an attempt to reach non-respondents. The success rate for this effort was low due mainly to the fact that many of the mailing lists MAXIMA received and used for the mailing were somewhat out-of-date. This meant that many of the people listed had long since moved, changed jobs, or were simply not listed in local telephone directories making it impossible to reach them. This unsuccessful follow-up campaign was, in part, the reason for conducting the additional mailings.

RESPONSE RATE

	No. Mailed	No. Returned	Response Rate
1st Mailing	1000	282	28.2%
2nd Mailing	200	41	20.5%
3rd Mailing	500	123	24.6%
4th Mailing	300	68	22.7%
5th Mailing	1200	280	23.3%
P.O. Returns	-56		
Total Mailing	3144	794	25.3%

Data Analysis

As survey forms were received they were logged in according to individual code numbers that appeared on each questionnaire. The questionnaires were then key-punched. The Statistical Package for the Social Sciences (SPSS) was chosen for the computer analysis of the data. As of April 30, 1982, 271 forms had been processed on tape for preliminary analysis. SPSS programs were developed and frequency distributions and cross-tabulations were run and presented for comment to the EDIS staff. This preliminary computer analysis allowed EDIS and MAXIMA to design the optimum SPSS program for the final data analysis.

Respondent Typology: One of the changes in the computer program resulting from the preliminary analysis was the development of a respondent "typology." Several items on the questionnaire, designed to identify types of respondents, were examined and categories of respondent types were combined, resulting in fewer, but more homogeneous groups of respondents. These respondent types formed the basis for the resulting analyses. Each type was examined according to how it responded to the subjective part of the survey instrument. The respondent typology is presented on page 9.

Summary of Findings: Upon completion of SPSS computer runs, the survey data were arranged in the tables that appear throughout this text. The tables contain statistics relating to both the number of responses to each question as well as percentages that correspond to the numbers. The reader should note, however, that not all tables contain the same types of statistics. Most contain row percentages that correspond to the respondent typology or other row headings used. The row percentages add across to 100%. Other tables, such as Table 10, do not include total percentages. In these instances the percentages were not deemed relevant to the information presented.

Table 2. Typology Index

Typology Number	Components
1	Managers in Private Firms[a]
2	Scientists in Private Firms[b]
3	Analysts in Private Firms[c]
4	Others in Private Firms[d]
5	Managers in Research or Educational Institutes
6	Scientists in Research or Educational Institutes
7	Analysts in Research or Educational Institutes
8	Others in Research or Educational Institutes
9	Managers in Government Agencies
10	Scientists in Government Agencies
11	Analysts in Government Agencies
12	Others in Government Agencies
13	Managers in Other Organizations[e]
14	Scientists in Other Organizations
15	Analysts in Other Organizations
16	Others in Other Organizations

[a] Includes from Survey Question 4b, the categories Chief Executive Officer and Unit Manager

[b] Includes from Survey Question 4b, the categories Staff Scientist and Research Scientist

[c] Includes from Survey Question 4b, the categories Consultant/Advisor, Planner, and Analyst

[d] Includes from Survey Question 4b, the categories Teacher/Educator, Data Manager, Librarian, Writer/Editor, Technician, and Other

[e] Includes from Survey Question 1, the categories Trade Association, Professional Society, Myself, and Other

SUMMARY OF FINDINGS

Need For Service

One of several principal research questions which was addressed by the survey was on the perceived need for services of the type to be provided by NEDRES. From reviewing data collected on the previous experience of the respondents with environmental data, one can safely draw the conclusion that the overwhelming majority of respondents are users of information which is at least similar to the data to be referenced in NEDRES. Responses to the item "How often do you use the following types of data?", are summarized on Table 3. Type of Environmental Data Used by Frequency of Use.

Nearly 70 percent of those responding indicated that they use climatological/meteorological environmental data at least once a month. Nearly half (46 percent) indicated that they used oceanographic data and 43 percent reported using atmospheric radiation, physical science and chemical science data at least once a month.

Responses to the question "Which of the following EDIS services have you used in the past?", are presented on Table 4. Respondents' Use of NOAA Environmental Data and Information Services. Again, the data indicate that the majority of respondents are frequent users of environmental data. Fifty-one percent of those responding indicated that they use the National Climate Center, 39 percent reported having used the National Oceanographics Data Center and 39 percent reported using the National Geophysical and Solar-Terrestrial Data Center.

Clearly then, the respondents are users of environmental data. Therefore, the question on the need for service becomes a question of the usefulness of NEDRES as a tool for continuing current use patterns or for facilitating access to new data which otherwise might have been difficult to identify or obtain.

Degree of Usefulness of NEDRES

The survey instrument included a detailed description of NEDRES. Respondents were informed that NEDRES was to be a data referral service which would provide descriptive information on available environmental data bases,

Table 3. Type of Environmental Data Used by Frequency of Use

TYPE OF DATA	FREQUENCY OF USE: USE AT LEAST ONCE PER MONTH No.	%	NEVER USE No.	%	ROW TOTAL No.	%
Climatology/Meteorology	481	69.3	213	30.7	694	100.0
Oceanography	307	46.3	356	53.7	663	100.0
Coastal and Ocean Pollution	171	27.1	459	72.9	630	100.0
Atmospheric Radiation, Physics, Chemistry	273	42.5	370	57.5	643	100.0
Air Quality	226	36.2	398	63.8	624	100.0
Ocean Minerals/Energy	112	18.2	502	81.8	614	100.0
Geophysics, Geomagnetics, Seismology	225	35.2	414	64.8	639	100.0
Solar Terrestrial Physics	191	30.2	442	69.8	633	100.0
Marine Geology	203	32.3	426	67.7	629	100.0
Geodesy, Cartography	223	36.1	395	63.9	618	100.0
Glaciology	83	13.9	512	86.1	595	100.0
Aquatic Ecology and Limnology	139	22.8	471	77.2	610	100.0

Table 4. Respondents' Use of NOAA Environmental Data and Information Services

EDIS SERVICES	HAVE USED SERVICE					
	YES		NO		TOTAL	
	No.	%[a]	No.	%	No.	%
National Climatic Center	396	56.4	306	43.6	702	100.0
National Geophysical and Solar-Terrestrial Data Center	257	38.9	404	61.1	661	100.0
National Oceanographic Data Center	255	39.1	397	60.9	652	100.0
Center for Environmental Assessment Services	78	13.0	520	87.0	598	100.0
Environmental Science and Information Centers	188	29.7	445	70.3	633	100.0

[a] Percentages represent percentage of respondents who indicated that they have or have not used the services listed.

files, holdings, etc. Several proposed services were also included in the description.

Two questions were posed to the respondents regarding the usefulness of a system such as NEDRES. The first pertained to the usefulness of having access to a data referral service such as the one proposed. The responses to this item are displayed on Tables 5 and 6.

The respondents were categorized by type of position and type of organization as described in the preceding section on methodology.

Overall, 83 percent of the respondents indicated that access to NEDRES would be at least "somewhat useful." Twenty-three percent of those responding indicated that access to NEDRES would be "very useful" in their work.

Given the fact that the majority of the respondents are current users of environmental data, it is not surprising that most of the respondents indicated that access to NEDRES would be useful. This is especially true given the fact that no obligations as far as payment for the service or participation in a data sharing network were mentioned in the item regarding usefulness of the system. However, as will be shown later, respondents did indicate a willingness to participate in and share the cost of the system. Also the fact that NEDRES will be available on a fee for service basis was clearly explained in the description of the proposed system which was included in the survey instrument.

In general, the degree of usefulness of access to NEDRES did not vary substantially between managers, scientists and analysts who responded. However, by comparison, a higher percentage of scientists did indicate that access to NEDRES would be very useful in their work. Usefulness of access also did not vary substantially between respondents working in private industry, research and educational groups, and government (see Table 6).

A computer searchable index of publicly available data files proved to be the most useful NEDRES service according to those responding to the survey. Twenty-four percent indicated that the computer searchable index aspect of NEDRES would be very useful and 33 percent indicated that it would be useful. Less than 10 percent of those responding indicated that they had no

Table 5. Degree of Usefulness of Access to NEDRES Type Service

RESPONDENT	USEFULNESS											
	NO USE		NOT VERY USEFUL		SOMEWHAT USEFUL		USEFUL		VERY USEFUL		ROW TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Manager	16	6.5	35	14.2	86	40.0	66	26.8	43	17.5	246	100.0
Scientist	5	1.7	31	10.7	85	29.4	85	29.4	83	28.7	289	100.0
Analyst	7	3.8	10	12.7	25	31.6	24	30.4	13	16.4	79	100.0
Other	10	6.4	18	11.5	48	30.6	46	29.3	35	22.3	157	100.0
Column Total	38	4.9	94	12.2	244	31.6	221	28.7	174	22.6	771	100.0

Table 6. Degree of Usefulness of Access to NEDRES Type Service

RESPONDENT	USEFULNESS											
	NO USE		NOT VERY USEFUL		SOMEWHAT USEFUL		USEFUL		VERY USEFUL		ROW TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Private Industry	12	4.4	38	14.1	82	30.4	75	27.8	63	23.3	270 (35.0).	100.0
Research or Educational Institution	3	1.5	16	8.0	55	27.5	75	37.5	51	25.5	200 (25.9).	100.0
Government	12	7.1	21	12.4	60	35.5	38	22.5	38	22.5	169 (21.9).	100.0
Other	11	8.3	20	15.0	47	35.3	33	24.8	22	16.5	133 (17.2).	100.0
Column Total	38	4.9	95	12.3	244	31.6	221	28.6	174	22.5	772 (100.0).	100.0

Table 7. Usefulness of Proposed Data Related Services

SERVICE	USEFULNESS											
	NO USE		NOT VERY USEFUL		SOMEWHAT USEFUL		USEFUL		VERY USEFUL		ROW TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Computer Searchable Index of Publicly Available Data Files	71	9.4	78	10.4	173	23.0	250	33.2	180	23.9	752	100.0
Newsletters and Announcements on Data Availability	38	5.0	69	9.1	230	30.4	282	37.3	137	18.1	756	100.0
Active Network of Data Users/Producers	117	15.7	202	27.2	204	27.5	149	20.1	71	9.6	743	100.0
Published Catalogs of Data Sources	34	4.5	54	7.2	219	29.1	288	38.3	157	20.9	752	100.0
Clearinghouse for Data Related Products Information	82	11.1	152	20.5	267	36.0	172	23.2	68	9.2	741	100.0
Training Sessions on Use of On-Line Directory	122	16.5	218	29.5	208	28.1	125	16.9	67	9.1	740	100.0
Annual Data Users Workshops	172	23.1	246	33.1	191	25.7	97	13.1	37	5.0	743	100.0

use for such a service. Published catalogs of data sources ranked second among the services described with nearly 60 percent of those responding indicating that the service would be useful or very useful (see Table 7).

System Configuration

A major consideration in the configuration design and implementation of NEDRES involves the establishment of system access methods best suited to the user community. In recognition of this important issue, survey recipients were asked to rank their preferences (first, second, and third choice) from among six possible modes of access. These methods were: (1) on-line searching of the NEDRES files using in-house computer terminals; (2) requesting a central NEDRES Program Office to conduct the search and forward the printout to the requestor; (3) similarly, requesting a local or regional office to conduct the search; (4) specifying the data required and automatically receiving it by mail as the system receives it and matches it to the specifications, commonly known as selective dissemination of information (SDI); (5) receiving customized information bulletins at regular intervals; and (6) receiving copies of the NEDRES master file for loading into the requestor's in-house computer system.

In all likelihood, a combination of these approaches to providing access to the system will be advisable. A mix of methods will ensure that: (1) all types of users will have equal access to information; (2) there is a mode of access that is most appropriate for the user's information needs and organizational structure; and (3) that NEDRES will be flexible in its ability to respond to the varying frequencies of requests for information likely to be encountered by various kinds of users.

Table 8. Ranked Preference for Access to NEDRES, presents the resulting cross-tabulation of ranked preference of the six possible access modes. According to the data in Table 8, on-line searching is by far the most popular access method among survey respondents. Nearly half (45.5 percent, N = 296) of the respondents identified on-line searching as their preferred method of access to the system. All other modes were far less preferred as a first choice, with only 13.2 percent (the second highest row percentage) of the respondents identifying regular receipt of information bulletins as being

Table 8. Ranked Preference for Access to NEDRES

RANKED PREFERENCE FOR ACCESS METHOD	METHOD OF ACCESS													
	ON-LINE SEARCHING		CENTRAL REQUEST		LOCAL REQUEST		SDI		RECEIVE BULLETIN		COPY MASTER FILE		ROW TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Preferred Method of Access	296	45.4	74	11.3	81	12.4	64	9.8	86	13.2	51	7.8	652	100.0
Second Preferred Method of Access	68	10.7	140	22.0	123	19.3	101	15.9	97	15.2	97	15.2	637	100.0
Third Preferred Method of Access	58	9.5	130	21.3	87	14.3	131	21.5	126	20.7	78	12.8	610	100.0